
CASE REPORT

Inverted Meckel's Diverticulum — A Rare Complication of a Common Congenital Anomaly: A Case Report

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INTRODUCTION

Meckel's diverticulum is the most common congenital anomaly of the gastrointestinal tract and found in approximately 2% of the population. Most Meckel's diverticula remain clinically silent with an estimated lifetime risk of complications reported to be about 4% to 40%.¹ Inversion of Meckel's diverticulum is a rare phenomenon that occurs when the diverticulum invaginates upon itself into the lumen of the terminal ileum. This can be further complicated by small bowel haemorrhage and intussusception, where the inverted diverticulum acts as a lead point.² We describe a case of inverted Meckel's diverticulum presenting with acute small bowel haemorrhage.

CASE REPORT

A 43-year-old man presented with a 2-week history of recurrent central abdominal pain and an episode of haematochezia. On admission, he was clinically stable and clinical examination did not reveal any mass or tenderness in the abdomen. Per rectal examination found a trace amount of fresh blood. However, six episodes of massive fresh per rectal bleeding developed subsequently with a witnessed episode of syncope. Haemoglobin

dropped from 94 g/L on admission to 63 g/L and urgent oesophagogastroduodenoscopy and colonoscopy were performed. No obvious source of bleeding could be identified although a large amount of old blood product was seen in the terminal ileum on colonoscopy, raising a suspicion of small bowel haemorrhage.

Computed tomographic angiography of the abdomen and pelvis was arranged and revealed an elongated tubular fat-containing lesion within the lumen of the distal ileum, about 60 cm from the ileocaecal junction. The lesion contained a central fatty core surrounded by a collar of enhancing soft tissue (Figure 1). There was continuity between mesenteric fat and the fatty core. Strand-like densities were also observed within the fatty core and appeared to be connected to branches of the mesenteric vessels (Figure 2). No active contrast extravasation was detected. Inverted Meckel's diverticulum was the main differential diagnosis given the morphology and location of the lesion and its continuity with mesenteric fat.

Urgent laparotomy was performed. Intraoperatively, a mass was felt along the distal ileum, about two thirds along the length of the small bowel from the ligament of

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Submitted: 15 Jul 2018; Accepted: 10 Aug 2018.

Contributors: All authors contributed to the concept of study, acquisition and analysis of data, drafting of the manuscript, and had critical revision of the manuscript for important intellectual content. All authors had full access to the data, contributed to the study, approved the final version for publication, and take responsibility for its accuracy and integrity.

Conflicts of Interest: All authors have disclosed no conflicts of interest.

Funding/Support: This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Ethics Approval: Informed consent was obtained from the patient. The study was conducted in accordance with the Declaration of Helsinki.

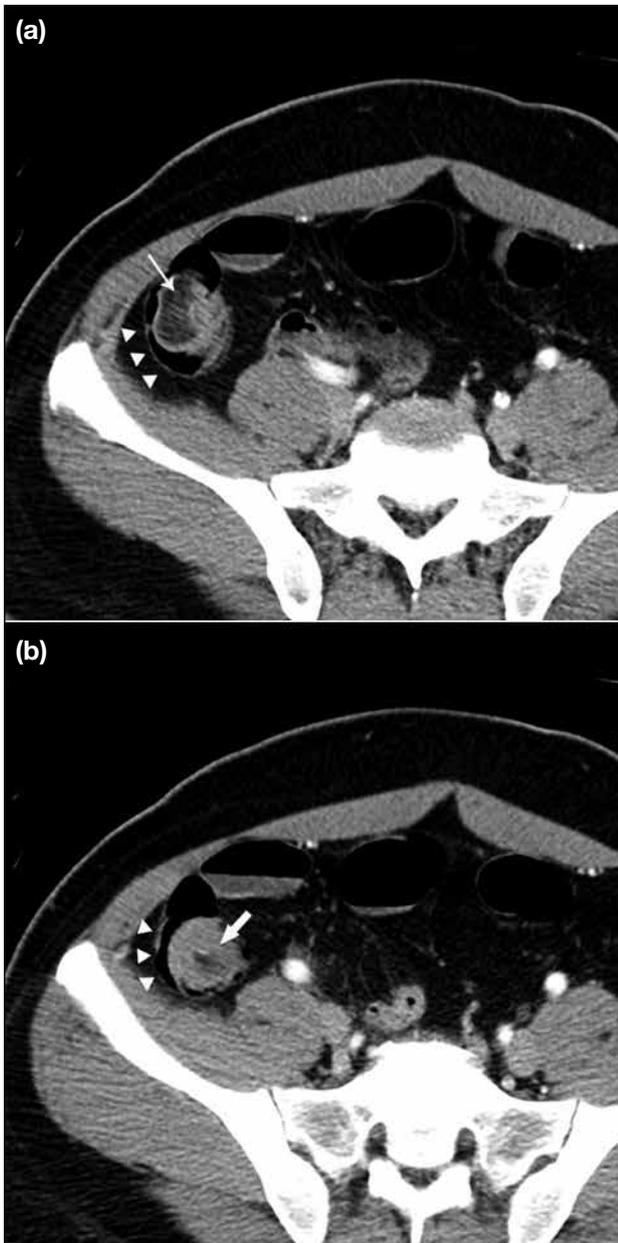


Figure 1. Selected axial computed tomography images in the angiographic phase showing the cross-sectional view of the inverted Meckel's diverticulum (a) at a higher position, its fatty core (thin arrow); and (b) at a lower position, the enhancing wall (thick arrow) of the inverted Meckel's diverticulum, located within the lumen of the distal ileum (arrowheads).

Treitz. On the serosal side of the small bowel segment where the mass was located, a focal point of invagination of the bowel wall and mesenteric tissue into the luminal side was identified. The finger-like intraluminal mass was brought out via an enterostomy (Figure 3). Ulcerative mucosa was seen along the inverted diverticular wall with a pulsative spurter. The involved segment of

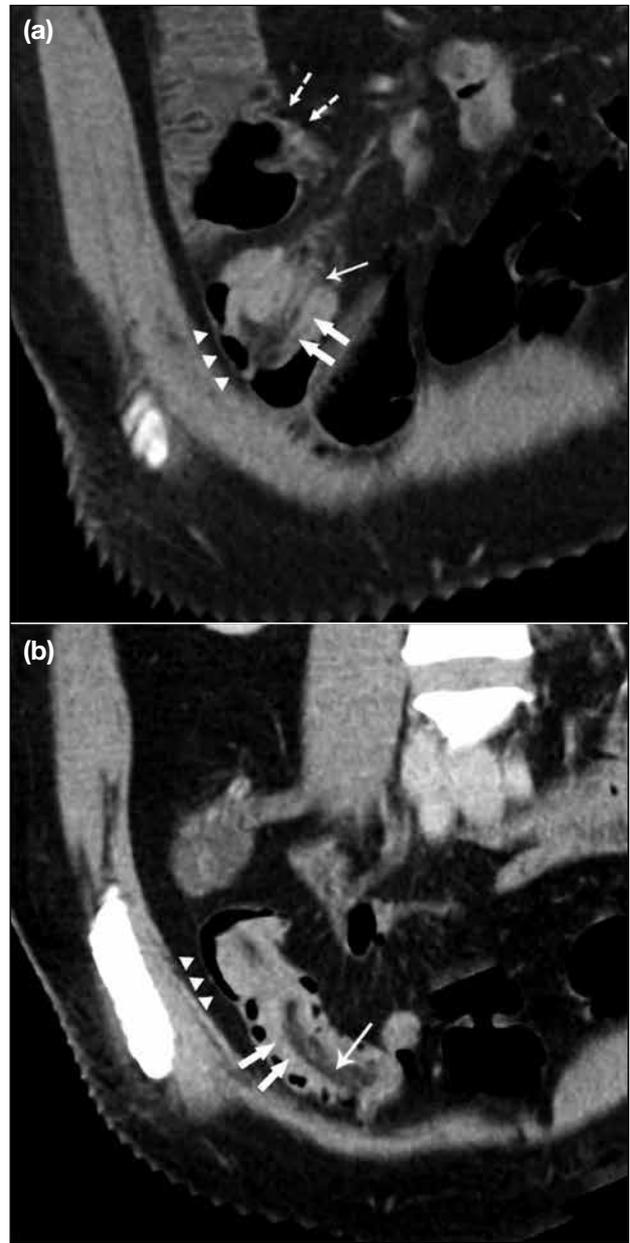


Figure 2. Selected oblique coronal reformatted computed tomography images showing (a) the base of the inverted Meckel's diverticulum where the full layer of diverticular wall (thick arrows) and mesenteric fat (thin arrow) are invaginated into the lumen of the distal ileum (arrowheads), and (b) the fatty core (thin arrow) and enhancing wall (thick arrows) of the inverted Meckel's diverticulum within the lumen of the distal ileum (arrowheads). The position of the ileocaecal junction is indicated by dashed arrows.

small bowel was resected and an end-to-end ileoileal anastomosis created. The procedure was uneventful.

Gross examination of the resected specimen confirmed an inverted diverticulum manifesting as a 7-cm long tubular intraluminal mass. Histological examination showed that the lesion contained all layers of the

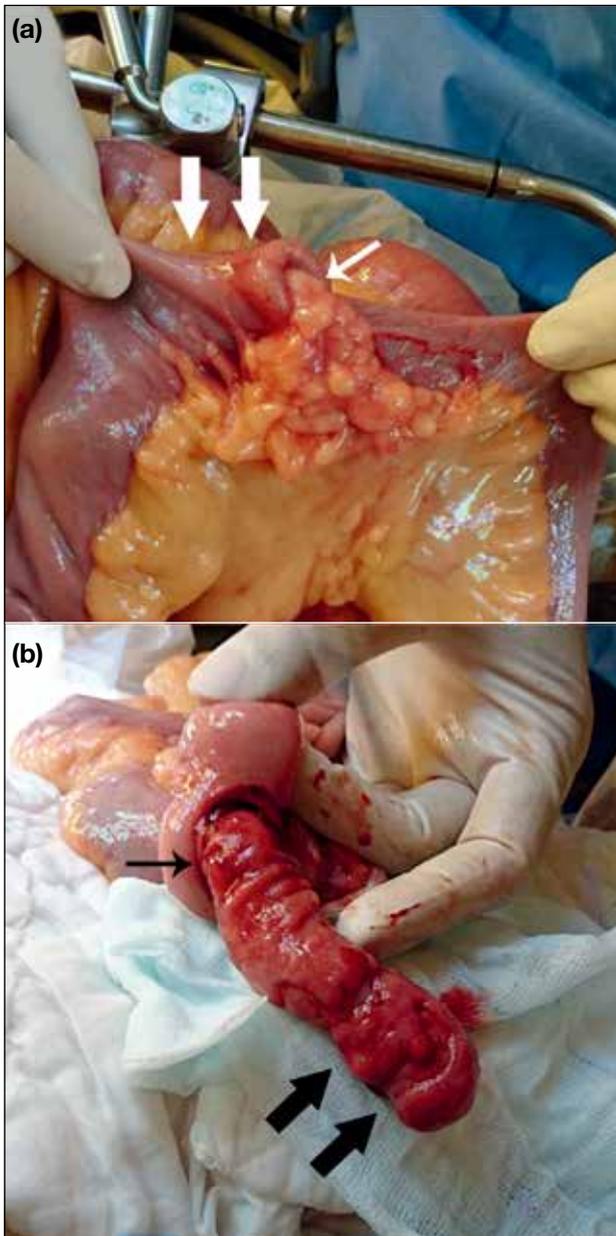


Figure 3. Operative photos showing (a) invagination of the mesenteric fat of inverted Meckel's diverticulum (thin white arrow) into distal ileum (thick white arrows), and (b) the entire specimen of inverted Meckel's diverticulum with the bulbous tip (thick black arrows) and base (thin black arrow).

intestinal wall, as well as a core of fibroadipose tissue that consisted of invaginated mesenteric tissue. The mucosal surface of the lesion had focal ulcerations and contained heterotopic gastric tissue (Figure 4).

DISCUSSION

Meckel's diverticulum results from failure of regression of the omphalomesenteric duct that connects the yolk

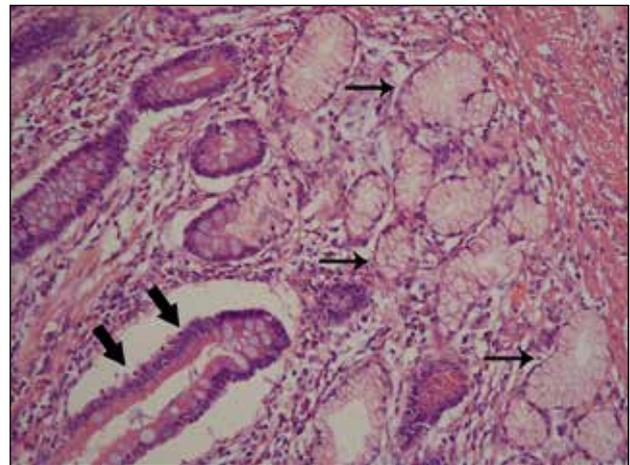


Figure 4. Microphotograph showing nests of heterotopic gastric epithelium (thin black arrows) within the mucosa of Meckel's diverticulum, otherwise lined by intestinal epithelium (thick black arrows). Haematoxylin and eosin stain, original magnification 200x.

sac to the mid gut through the umbilical cord in the embryo. This duct typically closes by the 5th to 8th week of gestation. Meckel's diverticulum arises from the antimesenteric border of the distal ileum, typically within 100 cm of the ileocaecal valve. It usually measures up to 5 cm in length and 2 cm in diameter. Heterotopic mucosa, most commonly gastric type (up to 60%), is found in about half of Meckel's diverticula. Although most Meckel's diverticula remain clinically asymptomatic, they can be complicated by haemorrhage from peptic ulceration, diverticulitis, intussusception, volvulus, or development of neoplasm within the diverticulum and inversion.¹

Inversion of Meckel's diverticulum is a rare phenomenon, with about 70 cases reported in the English literature.^{2,3} The condition occurs when the diverticulum inverts upon itself and invaginates into the lumen of the terminal ileum. The pathophysiology is not well understood. One theory is that abnormal peristaltic movement at the base of the diverticulum due to ectopic tissue or ulceration causes the diverticulum to invert.⁴ The most common complications are intussusception, where the inverted diverticulum acts as a lead point, and gastrointestinal bleeding due to ulceration in the inverted diverticulum. Although ulceration in Meckel's diverticulum is most commonly due to acid secretion by heterotopic gastric mucosa, it also occurs in inverted Meckel's diverticulum that does not contain heterotopic gastric mucosa. This is postulated to be due to repeated mucosal trauma due to intermittent intussusception of the diverticulum and its

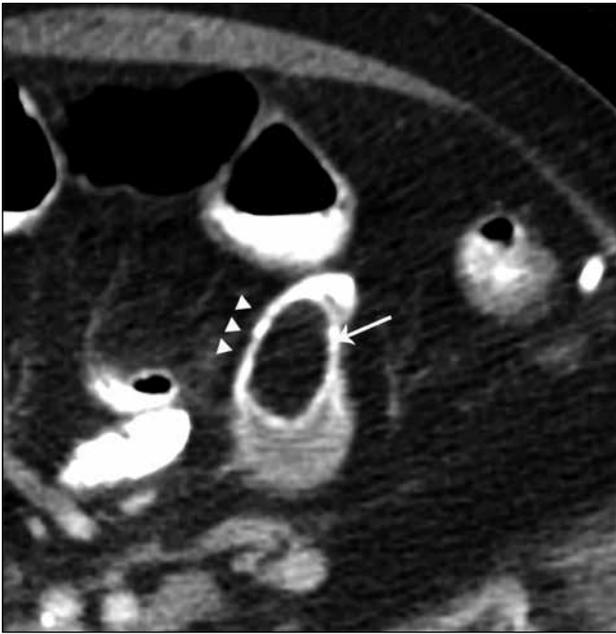


Figure 5. Axial computed tomography from another patient showing a small bowel lipoma (white arrow) within the lumen of the ileum (arrowheads). It lacks the soft tissue collar seen in inverted Meckel's diverticulum.

potential ischaemic vulnerability as the diverticulum is supplied by the remnant of the vitelline artery, an end branch of the superior mesenteric artery, and has no collateral arterial supply.^{4,5}

Patients with an inverted Meckel's diverticulum can present with a constellation of symptoms consistent with acute or chronic gastrointestinal bleeding, intestinal obstruction or recurrent abdominal pain, depending on the complications.³ Computed tomography (CT) is an important diagnostic tool since clinical diagnosis of inverted Meckel's diverticulum can often be challenging.

Inverted Meckel's diverticulum has characteristic imaging features on CT. The inverted diverticulum appears as a tubular intraluminal small bowel lesion located in the distal small bowel with a central fatty core

that demonstrates continuity with mesenteric fat. This correlates with the invagination of mesenteric tissue into the core of the inverted diverticulum. A thick rim of enhancing soft tissue around the fatty core corresponds to the full layer of the diverticular wall.²⁻⁴ Intermittent bleeding may cause false negative findings on CT angiography.⁶ Bowel-in-bowel appearance can be seen if the diverticulum acts as the lead point for intussusception.⁷ These features readily allow differentiation from other fat-containing small bowel lesions, namely lipoma and ileal-ileal intussusception. A small bowel lipoma is covered only by a thin layer of mucosa and lacks the thick soft tissue collar seen in inverted Meckel's diverticulum (Figure 5). More importantly, the fat within the lipoma does not demonstrate continuity with mesenteric fat. In ileal-ileal intussusception, the central part of the intussusceptum contains bowel lumen instead of fat and the mesenteric fat lies between the intussusceptum and intussusciptions.

Definitive treatment of an inverted Meckel's diverticulum is surgical resection of the involved segment of small bowel with subsequent anastomosis.²

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